

ANSYS water-wind flow simulation to study pressure generated under various conditions to generate electricity using piezoelectric cells

ABSTRACT

Currently there is a demand for clean renewable sources of energy. Very few developments have been done to harvest energy from natural phenomenon such as rain drops. The objective of this paper is to identify the pressure that can be developed from rain drops hitting the surface of a piezoelectric cell and the respective voltage that can be generated from it. This paper presents a model that has been developed to harvest the kinetic energy of rain using piezoelectric devices. The roof of the model was kept at 45° and subjected to load test and water pressure test to simulate conditions of a rainy weather and the test data were recorded. ANSYS analysis has also been performed with the fluid velocity being set at 20 m/s, 30 m/s, 40 m/s and 50 m/s which strikes the roof of a building kept at 0°, 45° and 60°. The analytical results were compared to the model experimental results for validating the process. Experimental results from the prototype recorded that a maximum of 18.7 Volts of electrical energy can be generated. This study proves that the harvesting small energy from rain is significant as a secondary source of green energy that could compliment to the green energy system.

Keyword: Piezoelectric; ANSYS; Electricity; Generator; Wind-water